CEL 240 Series

Digital Sound Level Meter

Frequently Asked Questions

Casella USA is proud to announce the CEL-240 sound level meter. These FAQ's help to give an overview of the current models, answer some of the more typical questions that arise and describe how they fit into the overall CEL product portfolio of noise measurement instruments.

CEL-240

"EZ does it"

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FAQ's: INTRODUCTION

How does the instrument fit into the CEL range?

CEL-200 Series

The simplest meters in the CEL range remain the CEL-200 series including the existing CEL-231 and 254 models and now the new **CEL-240**. These 3 models are ANSI type 2 accuracy sound level meters with Sound Pressure Level (SPL), Maximum Noise Level (Max) and Impulse response (not CEL-231) measurement capabilities.

CEL-300 Series

The intermediate range of convertible personal noise dosimeters or logging sound level meters is in the form of the CEL-320 or CEL-360. Simply swap out the microphone inputs to convert the dosimeter into the sound level meter or vice versa. Both models feature ANSI type 2 accuracy for overall measurements. The new CEL-350 dBadge dosimeter adds a small badge style dosimeter with cable-less microphone to the range for added convenience.

CEL-400 Series

The mid range sound level meters are the CEL-430, 450 and 490 providing recording of level against time or level against frequency. The 450 and 490 instruments are fitted with parallel (real time) frequency analysis capability in either full octave or third octave bands. ANSI type 1 and type 2 / data logging or non-data logging models are available for the CEL-400 sound level meter range.

CEL-500 Series

The top of the range meters are the CEL-553, 573 and 593 real time analyzers which feature parallel capture of level against time and frequency. A range of versatile upgrade options for such specific tasks as Rapid Data Storage, Building Acoustics, Sound Quality and Long Term Logging measurements are also available. All models meet the ANSI type 1 models are available.

FAQ's: COMPARISON OF MODELS

What models are there in the range?
A single model variant is available – the **CEL-240**. It is a completely new design compared to the earlier CEL-231 & 254 models in the original 200 series.

What are the main features & benefits of the CEL-240?
The main differences between the CEL-240 and the earlier 231/254 instruments are the use of digital signal processing (DSP) technology and a low power consumption microprocessor that is unique in such a low cost instrument. The meter features the instantaneous sound level plus the maximum hold feature on all screens plus a real time bar graph display. This makes the **CEL-240** model extremely useful in circumstances where the noise levels are fluctuating and where the time history trending graph will be useful for seeing changing noise levels of short events. A simple digital output is also available to link to a personal computer for basic data logging applications.

FAQ's: OPERATION

How long will standard alkaline batteries last in a CEL-240?
A set of 3 x AA alkaline cells can power a **CEL-240** for more than **35 hour's** continuous operation at normal room temperature. Lower temperatures will reduce useful battery life. Good quality alkaline batteries are recommended for longest running time.

Can rechargeable batteries be used in a CEL-240?
A set of 3 x AA NiMH rechargeable batteries can be used instead of alkaline batteries and battery life will be around the same time at normal room temperature. The rechargeable batteries will operate successfully down to lower temperatures than an alkaline battery set. NiMH batteries must be recharged outside the **CEL-240** and can be used repeatedly in these instruments. When NiMH batteries are run down they can be recharged in a few hours and used again up to the number of recharge cycles recommended by the battery manufacturer. Typically this will be around 300 – 500 charge cycles.

How can the instrument be powered from an external source?
The **CEL-240** is designed to be powered from an external supply via the USB connector that is available on the bottom of the meter. This takes the usual 5Vdc supply from the USB port of a laptop or desktop computer via a suitable cable.

Can the microphone of a CEL-240 be removed?
The microphone unit of a **CEL-240** is not removable therefore remote operation is not normally possible. In special circumstances it may be possible to fit a length of plastic tubing of ¼" internal diameter over the end of the microphone in order to place the open end near to a machine noise source that would be dangerous to approach so closely.

Can the CEL-240 be used for outdoor measurements?
The **CEL-240** is not designed for extended use outdoors since it is not completely sealed against the likely wind and rain that would spoil such measurements.

How quickly does the digital display update during measurements?

The digital display shows samples of the continuous rms sound pressure level updated twice every second. This is a compromise between updating the display too quickly making it too difficult to see the readings and being too slow for the update routine in which case the display would appear very sluggish. In a non-integrating instrument tests have shown about 2 or 3 times a second to be about the optimum rate that the brain can interpret without missing valuable information.

Is the time history trace stored in the CEL-240?

The **CEL-240** has a display mode that allows the user to see the last 1 minute or 5 minute trend of the changing instantaneous noise levels as they vary. These samples are not stored in the instrument but are available at the mini USB connector at the bottom of the meter for output to a suitable data logging device such as a computer.

What outputs are available from the CEL-240?

The 2.5 mm three-pole jack socket on the bottom of the case of the **CEL-240** provides both the ac and log dc signals to external equipment. The ac output signal is used for connection to an audio tape recorder or spectrum analyser. The dc output is used to provide a signal to a data logger or paper chart recorder.

What are the characteristics of the ac output?

The ac output is a conditioned signal that has been passed through the selected frequency weighting. This means that it will give either an 'A' or 'C' response signal that represents the pressure waveform at the microphone. The 'C' setting is recommended for making audio recordings since it has a better (wider and flatter) frequency response than the 'A' weighting. The ac signal is available on the 2.5 mm jack socket at a level of up to 0.85 V rms for full scale deflection. This means that for a sound level of 100 dB measured on the Lo range of the meter the output would be 0.85 V rms. A signal at half the range FSD would output a voltage of 0.425 V rms and so on. A signal may still be present below the minimum scale deflection but may not still be linear at such low levels.

What are the characteristics of the dc signal?

The dc signal is a more slowly varying voltage after the time weighting network in the meter. Therefore, it will represent the same signal as seen on the display. It will have the selected 'A' or 'C' frequency and either the Slow, Fast or Impulse time weighting. The signal is optionally available on the 2.5 mm stereo jack socket at a level of up to 1.3 V rms at full scale deflection on each range. It increases at a rate of nominally 18.6 mV/dB for each range. A noise level of 100 dB on the Lo range would produce an output of 1.3 V rms while the same noise level but measured on the Lo range would produce an output of 0.742 V rms.

What are the characteristics of the digital output?

The digital output is produced every 1 second and provides both the A and the C frequency weighted sound level with the selected time response (S, F or I). The **CEL-240** has been designed to appear as an industry standard memory card format when connected to a personal computer. The optionally available program for the **CEL-240** called dB24 produces a standard text file format data file in the form of a list of date, time and the 1 second A and C sound levels with a carriage return. This can be imported into many standard office programs such as word processors or spreadsheets for further manipulation and graphing.

FAQ's: INSTRUMENT FUNCTION

What measurement ranges does the CEL-240 cover?

The **CEL-240** is equipped with two measurement ranges each covering a 70 dB dynamic span. These ranges cover the overall levels from 30 to 100 dB on the low (Lo) range setting, and levels from 60 to 130 on the high (Hi) range setting.

What results can be measured in a CEL-240?

The **CEL-240** will measure the following parameters during the measurement run:

- The **instantaneous sound pressure level** during the run,
- The maximum RMS level or **Lmax**,
- The last 1 minute or 5 minutes displayed as a trend graph over the full 70 dB range selected

What rms frequency weightings are available in the CEL-240?

Two broadband frequency weightings are provided in the **CEL-240** for the collection of the rms noise levels – the 'A' and 'C' weightings according to the international standards defined in IEC-651 and ANSI S1.4. Tolerances for these weightings are as specified in the type 2 classifications of these documents. This allows the **CEL-240** to be used for measuring the NRR rating method for choosing hearing protectors against excessively high workplace noise exposure.

What time weightings are available in the CEL-240?

The **CEL-240** is equipped with the Slow and Fast and Impulse time weightings to suit all requirements for general-purpose noise measurements. Use the Slow time response to "dampen" the readings to make it easier to see what is happening. Use the Fast response to more accurately follow the changing noise levels as they rise and fall. Use the Impulse response only when the regulations require it.

What exchange rates or Q values are available in the CEL-240?

There is no specific exchange rate available in the meters since this function is only associated with instruments that can measure the time average noise levels. Noise levels must be visually averaged by watching the digital display for the collection of noise dose results to satisfy the US Noise at Work regulations as specified in the OSHA, MSHA or DoD relevant documents. For most Noise at Work measurements for OSHA the meter should be set to the A frequency weighting and the Slow time response on the 60 to 130 dB Hi range.

How do I calibrate the CEL-240?

The **CEL-240** has a unique easy calibration routine that simply involves fitting the acoustic calibrator over the microphone and switching it on. The **CEL-240** will automatically detect the 1 kHz fixed level tone and will offer the user the choice to perform the calibration or to leave it as it was and abort the process. One push of the button on the front panel of the instrument will set the gain circuits in the meter to match to expected level of the calibrator and the process takes about 5 seconds to complete. No adjustments with screwdrivers or other keypad controls are required. The auto-calibration function can be used with 114.0 and 94.0 dB acoustic calibrators that operate at the industry standard frequency of 1 kHz. This is pre-programmed into the **CEL-240** in the configuration menu prior to the calibration process being initiated. It remains in the meter's memory until changed by the user.

FAQ's: ACCURACY & RESULTS

What accuracy is the instrument designed to fulfil?

The **CEL-240** instrument complies with the international standards in the type 2 classifications that classify the sound level meter as general-purpose instruments. This specifies an overall expected accuracy of +/- 2 dB under normal measurement conditions. Use of the instruments as dosimeters by visually averaging fluctuating noise levels may produce wider tolerances than this depending on how well the "on time" of a notional average level is measured.

Are any results saved when using the SLM mode?

Results are not saved in the instrument when any of the available display modes are used. The **CEL-240** is intended to allow the instruments to be used as a simple sound level meter for quick hand held surveys or as a simple front end to a data logging system in conjunction with a personal computer running the optional dB24 software.

FAQ's: APPLICATIONS

What markets is the instrument designed for?

There are three main markets for the **CEL-240**.

- a simple meter for monitoring noise exposure in the workplace
- a general purpose sound level meter for many environmental nuisance sources
- a short term noise meter for quick measurements on specific noise sources

How are these markets catered for by the CEL-240?

For many basic noise measurements the A weighted Slow response sound level will be all that is required. For more specific noise measurements of sounds with a transient nature the C weighting and the maximum hold feature will be of help. The meter can also be used as a simple teaching aid in many noise or general sound studies especially with the optional digital output to a computer. The tripod mount allows the meter to be fixed at a chosen location for longer term measurements that are not likely to be adversely affected by the weather conditions.

For more details on the **CEL-240** series, or any of the other Casella USA products, please contact us:

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